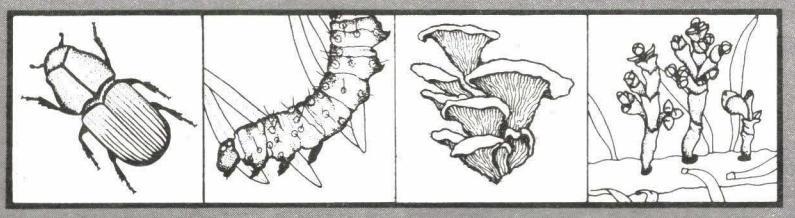
SB761
U7N6
87-10

Forest Pest Management



Report 87-10

3450
June 1987

AN EVALUATION OF FUNGICIDES TO CONTROL DIPLODIA TIP BLIGHT AT THE FANTASY FARMS NURSERY, PECK, IDAHO

by

R. L. James
Plant Pathologist
Cooperative Forestry and Pest Management
USDA Forest Service, Northern Region
Missoula, Montana

J. W. Schwandt
Forest Pathologist
Idaho Department of Lands

J. Y. Woo
Research Plant Pathologist (retired)
Intermountain Forest and Range Experiment Station

ABSTRACT

Benomyl and chlorothalonil were tested on 2-0 bareroot ponderosa pine seedlings as a means to reduce impact of Diplodia tip blight at the Fantasy Farms Nursery, Peck, Idaho. Infection levels were not adequate to assess effectiveness of the fungicides. However, techniques were developed which can be used to assess efficacy of fungicides when infection levels are normal. Most natural infection apparently occurs during the first growing season at this nursery. Fungicide recommendations based on experience with this disease at other nurseries are discussed.

INTRODUCTION

In 1984, tip blight of ponderosa pine (*Pinus ponderosa* Laws.) seedlings at the Fantasy Farms Nursery, Peck, Idaho was found to be mostly associated with infection by *Sphaeropsis sapinea* (Fr.) Dyko. & Sutton (= *Diplodia pinea* (Desm.) Kickx.) (James 1984b). The disease was most prevalent in 1-0 pine seedbeds and was scattered throughout several different beds. Only isolated infected seedlings were located in 2-0 seedbeds.

Isolates of *S. sapinea* obtained from blighted seedlings produced pigmented, one-celled conidia from black erumpent pycnidia located at the base of needles (James 1984a). Nearby large ponderosa pine were extensively damaged by Diplodia blight; the fungus was often found sporulating profusely on the cone scales from these trees. This fungus

LIBRARY COPY
ROCKY MT. FOREST & RANGE
EXPERIMENT STATION

United States Department of Agriculture | Forest Service | Northern Region | P.O. Box 7669 Missoula, Montana 59807

was apparently similar to that associated with severe disease of bareroot red pine (*Pinus resinosa* Ait.) common in Lake States nurseries (Palmer 1985).

Because of past severity of the disease and potential for extensive losses from future outbreaks, trials were conducted to evaluate the efficacy of fungicides to reduce damage to bareroot ponderosa pine seedlings by *S. sapinea* at the Fantasy Farms Nursery.

MATERIALS AND METHODS

Original plans called for tests in both 1-0 and 2-0 seedbeds. However, because of budget limitations, tests were only conducted on 2-0 stock. Plots were established in 2-0 seedbeds during the spring of 1985. Each treatment plot consisted of 5 linear feet of bed (approximately 4 feet wide), delimited on the ground with four wooden stakes. A 2-foot untreated buffer separated each plot. Four treatments were used (table 1), which included two fungicides (benomyl and chlorothalonil) and an untreated check. Two application rates were used for the benomyl treatments. Each treatment was replicated four times in a complete randomized block design. Fungicides were applied four times at 14-day intervals with a backpack sprayer commencing the first week of April and ending the last week of May. Fungicides were not applied during rainstorms, but were applied after the rain stopped. Seedlings within treatment plots were evaluated (1) in March, before bud break and commencement of fungicide applications, (2) in May, after fungicide applications, and (3) in October, at the end of the growing season. Information collected from seedlings included condition class (healthy, diseased with tip blight, dead, and feeding damage by deer). Numbers of seedlings in each of these condition classes was tallied during each evaluation. Data were analyzed using an analysis of variance. Percentages underwent arc-sin conversions prior to data analysis.

RESULTS AND DISCUSSION

Tips of many seedlings had been clipped by deer, although seedlings were usually not killed. We relied exclusively on natural infection by *S. sapinea* for our test. However, very little infection occurred and it was not possible to show significant statistical differences among the treatments with such low disease levels (table 1). If artificial inoculations had been used or natural infection levels had been higher, our results would likely have shown stronger differences.

Almost one-third of the seedlings within the plots were dead; causes were not ascertained, but tip blight during the first growing season and losses during the winter were likely involved. There was also evidence of extensive deer browsing in certain portions of the seedbeds.

Palmer et al. (1986) showed that infection occurred during both the first and the second growing seasons on red pine in the north central United States. Their work indicated that benomyl was effective in reducing disease incidence, especially if applied during both growing seasons. Their recommendations included applying the fungicide five to seven times from June through August of the first growing season. In their tests, severe infection occurred during the second year of growth if seedlings were not protected during the first year. They also recommended four benomyl applications at 14-day intervals during budbreak and shoot elongation (late April through early June in the north central States) of the second growing season.

LIBRARY COPY

Table 1.--Evaluation of fungicides to control Diplodia tip blight at the Fantasy Farms Nursery, Peck, Idaho.

		Percentages			
Treatment *1/*	No. seedlings in plots	Healthy *2/*	Dead *2/*	Blight *2/*	Blight *3/*
Benomyl #1	994	45.7	35.9	4.4	0.4
Benomyl #2	1,344	54.5	29.0	6.0	0.3
Chlorothalonil	1,094	44.3	31.4	5.1	0.4
Check	965	48.6	35.2	4.9	0.8
All treatments	4,397	48.7	32.5	5.2	0.5

1/ Benomyl #1 = 1 lb. (50% WP) per 100 gallons of water.
Benomyl #2 = 2 lbs. (50% WP) per 100 gallons of water.
Chlorothalonil = 3 lbs. (75% WP) per 100 gallons of water.
Check = No fungicide.

2/ Data taken in March 1985 prior to bud break and fungicide applications. Causes of seedling mortality unknown. Treatment differences for healthy, dead, and blighted seedlings were not statistically significant (P=0.05) using an analysis of variance.

3/ Combined data for evaluations in May and October 1985. Treatment differences were not statistically significant (P=0.05) using an analysis of variance.

The situation at the Fantasy Farms Nursery may be somewhat different than that reported by Palmer (1985). For example, there appeared to be very little disease during the second growing season, regardless of whether or not fungicides were applied. This may have been due to unusually dry weather conditions during the period of our test. On the other hand, most damage by this disease usually occurs in the first growing season at Fantasy Farms. Abundant inoculum is present around the Nursery; theoretically spores are always available for infection whenever environmental conditons are conducive. Additional tests are needed to evaluate efficacy of fungicides during the first growing season. However, until this can be done, it is recommended that control guidelines outlined by Palmer et al. (1986) be used at the Fantasy Farms Nursery.

LITERATURE CITED

James, R. L. 1984a. Characteristics of *Diplodia pinea* associated with tip dieback of ponderosa pine seedlings. USDA Forest Service, Northern Region. 5p.

James, R. L. 1984b. Tip blight of ponderosa pine seedlings at the Fantasy Farms Nursery, Peck, Idaho. USDA Forest Service, Northern Region. Rept. 84-3. 7p.

Palmer, M. A. 1985. Biology and forest tree nursery management of *Sphaeropsis sapinea* in the north central United States. Ph.D. dissertation. University of Minnesota, St. Paul. 102p.

Palmer, M. A., T. H. Nicholls, and C. F. Croghan. 1986. Fungicidal control of shoot blight caused by *Sphaeropsis sapinea* on red pine nursery seedlings. Plant Disease 70:194-196.